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EXAMINER

DONG, DALEI

ART UNIT PAPER NUMBER

2879

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/047,469

Applicant(s)

EDEN ET AL.

Examiner

Dalei Dong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-74 is/are pending in the application.
- 4a) Of the above claim(s) 56-74 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 18-43 and 45-55 is/are rejected.
- 7) ☐ Claim(s) 17 and 44 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 September 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/02, 5/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 56-74 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected method of fabricating a microdischarge device, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on October 18, 2004.

Oath/Declaration

2. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

It does not identify the mailing address of each inventor. A mailing address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing address should include the ZIP Code designation. The mailing address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76.

The specification to which the oath or declaration is directed has not been adequately identified. See MPEP § 602.

It does not state that the person making the oath or declaration has reviewed and understands the contents of the specification, including the claims, as amended by any amendment specifically referred to in the oath or declaration.

It does not identify the citizenship of each inventor.

It does not identify the city and either state or foreign country of residence of each inventor. The residence information may be provided on either on an application data sheet or supplemental oath or declaration.

Drawings

3. The drawings are objected to because in Figures 2A and 2B, the reference number are directed to the wrong components of the microdischarge device. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 26, 27 and 54 are objected to because of the following informalities:
- Claim 26 should be dependent upon claim 25 and not claim 15;
- Claim 27 should be dependent upon claim 25 and not claim 15;
- Claim 54 should be dependent upon claim 52 and not claim 35

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-6, 8, 10, 11, 13, 15, 16, 18, 20-32, 34, 36, 37, 39, 41-43, 44, 45 and 47-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,016,027 to DeTemple in view of U.S. Patent No. 5,691,608 to Yamamoto.

Regarding to claim 1, DeTemple discloses in Figure 1A, a microdischarge device (10), comprising: a first layer (14); an intermediate layer (18) on the first layer (14); and a second layer (20) on the intermediate layer (18), the intermediate layer (18) electrically insulating (dielectric layer 18) the first layer (14) from the second layer (20), the first (14 semiconductor layer) and second (20 anode) having a conductivity larger than that of the intermediate (18 dielectric layer) layer.

However, DeTemple does not disclose the first layer having a tapered cavity disposed therein. Yamamoto teaches in Figures 3A and 3B, a first layer (30) having a tapered cavity (recesses 34A, 34B, 34C) disposed therein.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the cavity of DeTemple with the tapered shape

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of Yamamoto in order to improve the efficiency of the emitting light exiting the device as well as improves the luminescent and brightness of the device.

Regarding to claim 2, Yamamoto discloses in Figures 3A and 3B, the cavity has an inverted square (top view shown in Figure 3A) pyramidal (sectional view shown in Figure 3B) shape and the motivation to combine is the same as above.

Regarding to claim 3, DeTemple discloses, the first layer (14) is a semiconductor (see column 3, lines 66).

Regarding to claim 4, DeTemple discloses, the first layer (14) comprises Si (see column 3, line 67).

Regarding to claim 5, DeTemple discloses in Figure 1A, the first layer (14), the intermediate layer (18) and the second layer (20) form a diode, and the intermediate layer is a depletion region of the diode (see column 4, lines 7-21).

Regarding to claim 6, DeTemple discloses in Figure 1A, the intermediate layer (20) comprises at least one dielectric layer (see column 4, lines 9-10).

Regarding to claim 8, DeTemple discloses in Figure 1A, an area of the cavity at a surface of the first layer (14) is not greater than 100 micron squared (see column 4, lines 30-36).

Regarding to claim 10, DeTemple discloses, the first layer (14) comprises Si (see column 3, line 67).

Regarding to claim 11, DeTemple in view of Yamamoto discloses the claimed apparatus of microdischarge device and the lifetime of the device is at least 10 hours is merely an intrinsic property of the device itself and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2112).

Regarding to claim 13, DeTemple discloses in Figure 1A, an area of the cavity at a surface of the first layer (14) is not greater than 100 micron squared (see column 4, lines 30-36).

Regarding to claim 15, DeTemple discloses, the first layer (14) comprises Si (see column 3, line 67).

Regarding to claim 16, DeTemple in view of Yamamoto discloses the claimed apparatus of microdischarge device and the lifetime of the device is at least 10 hours is merely an intrinsic property of the device itself and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2112).

Regarding to claim 18, DeTemple discloses in Figure 1A, the cavity (16) extends through at least a surface of the second layer (20).

Regarding to claim 20, DeTemple discloses a gas disposed in the cavity (see column 4, lines 7-9).

Regarding to claim 21, DeTemple discloses in Figures 1A and 1B, the second layer (20) comprises an electrically conducting screen disposed on an end of the cavity.

Regarding to claim 22, the screen serves as a cathode is merely depends on the polarity of the voltage applied and the type of the material used for the purpose, further it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Regarding to claim 23, DeTemple discloses in Figure 7, an optically transmissive material (38) that seals the cavity (see column 9, lines 64-67).

Regarding to claim 24, DeTemple discloses the first layer serves as a cathode of the microdischarge device (see column 3, lines 65-66).

Regarding to claim 25, DeTemple discloses in Figures 5-7, an array comprising a plurality of microdischarge device (see column 9, lines 40-50).

Regarding to claim 26, DeTemple discloses in Figures 5-7, the array is divided into independently excited sub-arrays (see column 9, lines 64-65).

Regarding to claim 27, DeTemple discloses in Figures 5-7, a light array comprising the array of microdischarge device.

Regarding to claim 28, utilizing a microdischarge device for a laser in merely an intended use of the microdischarge device and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Regarding to claim 29, DeTemple discloses in Figure 1A, a microdischarge device (10), comprising: a first layer (14); an intermediate layer (18) on the first layer (14); and a second layer (20) on the intermediate layer (18), the intermediate layer (18) electrically insulating (dielectric layer 18) the first layer (14) from the second layer (20).

However, DeTemple does not disclose the first layer having a tapered cavity disposed therein. Yamamoto teaches in Figures 3A and 3B, a first layer (30) having a tapered cavity (recesses 34A, 34B, 34C) disposed therein.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the cavity of DeTemple with the tapered shape of Yamamoto in order to improve the efficiency of the emitting light exiting the device as well as improves the luminescent and brightness of the device.

Regarding to claim 30, DeTemple discloses, the first layer (14) comprises Si (see column 3, line 67).

Regarding to claim 31, DeTemple discloses in Figure 1A, the first layer (14), the intermediate layer (18) and the second layer (20) form a diode, and the intermediate layer is a depletion region of the diode (see column 4, lines 7-21).

Regarding to claim 32, DeTemple discloses in Figure 1A, the second layer (20) is a metal (see column 4, lines 11-13).

Regarding to claim 34, DeTemple discloses in Figure 1A, an area of the cavity at a surface of the first layer (14) is not greater than 100 micron squared (see column 4, lines 30-36).

Regarding to claim 36, DeTemple discloses, the first layer (14) comprises Si (see column 3, line 67).

Regarding to claim 37, DeTemple in view of Yamamoto discloses the claimed apparatus of microdischarge device and the lifetime of the device is at least 10 hours is merely an intrinsic property of the device itself and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2112).

Regarding to claim 39, DeTemple discloses in Figure 1A, an area of the cavity at a surface of the first layer (14) is not greater than 100 micron squared (see column 4, lines 30-36).

Regarding to claim 41, DeTemple discloses, the first layer (14) comprises Si (see column 3, line 67).

Regarding to claim 42, DeTemple in view of Yamamoto discloses the claimed apparatus of microdischarge device and the lifetime of the device is at least 10 hours is merely an intrinsic property of the device itself and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2112).

Regarding to claim 43, DeTemple discloses the intermediate layer (18) comprises at least one dielectric layer having a lower electrical conductivity than the semiconductor (14) and second layer (20).

Regarding to claim 45, DeTemple discloses in Figure 1A, the cavity (16) extends through at least a surface of the second layer (20).

Regarding to claim 47, DeTemple discloses a gas disposed in the cavity (see column 4, lines 7-9).

Regarding to claim 48, DeTemple discloses in Figures 1A and 1B, the second layer (20) comprises an electrically conducting screen disposed on an end of the cavity.

Regarding to claim 49, the screen serves as a cathode is merely depends on the polarity of the voltage applied and the type of the material used for the purpose, further it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

Regarding to claim 50, DeTemple discloses in Figure 7, an optically transmissive material (38) that seals the cavity (see column 9, lines 64-67).

Regarding to claim 51, DeTemple discloses the first layer serves as a cathode of the microdischarge device (see column 3, lines 65-66).

Regarding to claim 52, DeTemple discloses in Figures 5-7, an array comprising a plurality of microdischarge device (see column 9, lines 40-50).

Regarding to claim 53, DeTemple discloses in Figures 5-7, the array is divided into independently excited sub-arrays (see column 9, lines 64-65).

Regarding to claim 54, DeTemple discloses in Figures 5-7, a light array comprising the array of microdischarge device.

Regarding to claim 55, utilizing a microdischarge device for a laser in merely an intended use of the microdischarge device and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987).

7. Claims 7, 9, 12, 14, 19, 33, 35, 38, 40 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,016,027 to DeTemple in view of U.S. Patent No. 5,691,608 to Yamamoto and in further view of U.S. Patent No. 6,147,349 to Ray.

Regarding to claim 7, DeTemple in view of Yamamoto discloses a microdischarge device (10), comprising: a first layer (14) having a tapered cavity disposed therein; an intermediate layer (18) on the first layer (14); and a second layer (20) on the intermediate layer (18), the intermediate layer (18) electrically insulating

(dielectric layer 18) the first layer (14) from the second layer (20), the first (14 semiconductor layer) and second (20 anode) having a conductivity larger than that of the intermediate (18 dielectric layer) layer.

However, DeTemple and Yamamoto does not disclose the angle of taper of the cavity is at least 20 degrees and at most 45 degrees. Ray teaches in Figure 3, a taper cavity (28) formed in the first layer (12) and the angle of taper of the cavity is at least 20 degrees and at most 45 degrees (see column 4, lines 31-46).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have constructed the cavity of DeTemple with the tapered shape of Yamamoto and further construct the taper with angle of Ray in order to improve the efficiency of the emitting light exiting the device as well as improves the luminescent and brightness of the device.

Regarding to claim 9, Ray teaches the depth of the tapered cavity (28) in the first layer (12) is not greater than 100 microns (see column 4, lines 39-42).

Regarding to claim 12, Ray teaches the angle of taper of the cavity is at least 20 degrees and at most 45 degrees.

Regarding to claim 14, Ray teaches the depth of the tapered cavity (28) in the first layer (12) is not greater than 100 microns (see column 4, lines 39-42).

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Regarding to claim 19, Ray teaches in Figure 3, the side walls of the cavity are coated with a film (30) that reflects light (see column 5, lines 1-13).

Regarding to claim 33, Ray teaches in Figure 3, a taper cavity (28) formed in the first layer (12) and the angle of taper of the cavity is at least 20 degrees and at most 45 degrees (see column 4, lines 31-46) and the motivation to combine is the same as above.

Regarding to claim 35, Ray teaches the depth of the tapered cavity (28) in the first layer (12) is not greater than 100 microns (see column 4, lines 39-42).

Regarding to claim 38, Ray teaches in Figure 3, a taper cavity (28) formed in the first layer (12) and the angle of taper of the cavity is at least 20 degrees and at most 45 degrees (see column 4, lines 31-46) and the motivation to combine is the same as above.

Regarding to claim 40, Ray teaches the depth of the tapered cavity (28) in the first layer (12) is not greater than 100 microns (see column 4, lines 39-42).

Regarding to claim 46, Ray teaches in Figure 3, the side walls of the cavity are coated with a film (30) that reflects light (see column 5, lines 1-13).

Allowable Subject Matter

8. Claims 17 and 44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding to claim 17, prior art of record taken alone or in combination fails to teach or suggest the intermediate layer comprises a plurality of dielectric layer, at least two of the plurality of dielectric layer having different dielectric constants in order to improve the discharge efficiency of the microdischarge device.

Regarding to claim 44, prior art of record taken alone or in combination fails to teach or suggest the intermediate layer comprises a plurality of dielectric layer, at least two of the plurality of dielectric layer having different dielectric constants in order to improve the discharge efficiency of the microdischarge device.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following prior art are cited to further show the state of the art of composition of a microdischarge device.

U.S. Patent No. 4,724,356 to Daehier.

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U.S. Patent No. 4,858,062 to Hayakawa.

U.S. Patent No. 5,387,805 to Metzler.

U.S. Patent No. 5,955,828 to Sadwick.

U.S. Patent No. 6,097,145 to Kastalsky.

U.S. Patent No. 6,139,384 to DeTemple.

U.S. Patent No. 6,695,664 to Eden.

U.S. Patent No. 6,815,891 to Eden.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalei Dong whose telephone number is (571)272-2370. The examiner can normally be reached on 8 A.M. to 5 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on (571)272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



D.D.

November 20, 2004



Joseph Williams
Primary Examiner
Art Unit 2879